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COLORIMETRIC AND PHYSIOLOGICAL ESTIMATION OF THE ACTIVE PRINCIPLE OF THE SUPRARENAL GLAND.

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Of the many color tests which have been proposed for the active principle of the suprarenal gland, none appears to have been developed to the accuracy required of a quantitative method. Several have been used for comparative studies on glands from different sources, but, so far as shown by the literature, no attempts have been made to correlate the results obtained by color tests with the activity as determined by physiological methods.

In applying a number of the better known color reactions to a series of desiccated suprarenal glands, for the purpose of selecting a suitable one for the forthcoming revision of the U. S. Pharmacopœia, it was noticed that considerable variation in the intensities of the colors from the several samples was obtained; preliminary blood pressure experiments with some of these samples confirmed the differences indicated by the color tests. It thereupon appeared probable that a colorimetric method which would yield results in close agreement with those obtained by the physiological standardization, could be developed.

Experiments with the various color tests which have been proposed, indicated that the potassium permanganate, the potassium ferricyanide with dilute ammonia, the sodium hydroxide, and the potassium permanganate with lactic acid, reagents, gave little promise of success. The iodine method of Abelous, Soule and

Toujan,[1] the mercuric chloride test of Comessati,[2] and the iodic acid reaction of Krauss[3] and independently described by Fränkel and Allers,[4] were found to be much more delicate. The suggestion of Abel[5] that the fleeting green color produced by ferric chloride could be rendered more permanent by addition of an excess of potassium benzene thiosulphonate was not followed up since the ferric chloride test is of such general applicability that it was thought to be less characteristic of the epinephrine base than the three tests mentioned above.

According to the iodine test of Abelous, Soule and Toujan, 10 c.c. of the 1 : 10,000 epinephrine solution is mixed with 5 c.c. of 0.1 n iodine and allowed to stand 15 minutes, the excess of iodine is then discharged with 0.1 n thiosulphate, the solution diluted to 50 c.c. and its color compared with standards made in the same way with a solution of the pure base. Experiments showed, however, that the intensity of the pink color increased with length of time allowed before the discharge of excess of iodine; moreover, the tints varied to such an extent that accurate comparison did not appear possible, and all the colors faded fairly rapidly on standing. With the mercuric chloride test which consists in adding a few drops of saturated $HgCl_2$ to the epinephrine solution and heating to the boiling point, the colors developed rather slowly, and furthermore, variations in shade and intensity were obtained from equal amounts of the active principle. The most satisfactory results were obtained with the iodic acid test, viz., by heating just to boiling, the mixture of equal parts of the solution to be tested and 0.2 per cent. KIO_3 solution. The addition of a few drops of dilute phosphoric acid as prescribed by Fränkel and Allers was found to be a disadvantage since it caused much more rapid fading of the color. Using a standard epinephrine solution containing 1 part per 50,000 of the pure base dissolved with the aid of twice the calculated amount of HCl to yield the hydrochloride, the pink color was found to remain practically unchanged for several days.

Although the color produced as above mentioned is fairly stable and would undoubtedly serve as a standard with which to compare

[1] *Compt. rend. soc. biol.*, **58**, 301, 1905.
[2] *Arch. Exp. Path. u. Pharm.*, **62**, 190, 1909–10.
[3] *Apoth. Ztg.*, **23**, 70, 1908.
[4] *Biochem. Ztschr.*, **18**, 40, 1909.
[5] *Johns Hopkins Hosp. Bull.*, **12**, 342, 1901.

unknown samples, it was considered desirable to have color standards which were certain to remain unchanged for an indefinite period. A casual examination of the pink tint produced from the epinephrine base by boiling with potassium iodate solution showed it to consist of a mixture of red and yellow. Unsuccessful efforts were made to find a particular dye which would yield an aqueous solution corresponding exactly to the tint in hand; mixtures of dyes would probably serve, but a better source was found in the color standards adopted by the committee on Standard Methods of Water Analysis of the American Public Health Association,[6] viz.: (a) platinum solution made by dissolving 20 gms. K_2PtCl_6 in a small amount of distilled water, adding 100 c.c. of conc. HCl, and diluting to 1000 c.c., (b) Cobalt solution made by dissolving 12 gms. of $CoCl_2$ $6H_2O$ in distilled water, adding 100 c.c. of conc. HCl, and diluting to 1000 c.c. By mixing these two solutions in approximately the proportion of 1 of the former to 3 of the latter the tint is almost indistinguishable from that produced from the epinephrine. The intensity of this color standard can then be adjusted by dilution to correspond exactly with that obtained by mixing 5 c.c. of the 1 : 50,000 solution of the ash free active principle of the suprarenal (dissolved with the aid of twice the calculated amount of HCl), with 5 c.c. of a 0.2 per cent. KIO_3 solution, thus yielding 0.1 mg. active principle per 10 c.c., heating just to the boiling point and after 15 minutes comparing with the permanent color standards in a suitable colorimeter. After standardization, a series of test tubes may be prepared with dilutions of the permanent standard corresponding to 0.01, 0.02, 0.03, 0.04, 0.06, 0.08 and 0.10 mg. active principle per 10 c.c. and the test tubes then labelled and sealed.

Various experiments made by boiling given amounts of the desiccated suprarenal glands with water, dilute HCl and mixtures of these with 0.2 per cent. KIO_3 solution indicated that the principal difficulty in the colorimetric determination is caused by the yellowish extractive material present in the aqueous solution of the sample. This in many cases interferes with the accurate estimation of the intensity of the pink color, and therefore leads to low results. It was found that the inconvenience due to yellowish tint was greatest when a larger amount of sample was used and the

[6] *Jour. Infectious Diseases,* Supplement I, p. 34, May, 1905.

resulting solution diluted to the required strength than when a proportionately smaller amount of sample was used and the solution not diluted.

With samples containing from 0.2 to 0.8 per cent. of the active principle, 0.01 gm. is placed in a test tube with 5 c.c. of dilute HCl (2.5 c.c. 0.1 n HCl per 100 c.c.) and 5 c.c. of 0.2 per cent. KIO_3 solution, the mixture heated just to the boiling point and allowed to stand 15 minutes; it is then filtered and the color compared with the series of standards corresponding to 0.01 to 0.10 mg. per 10 c.c. The position of the unknown can in practically all cases be fixed in this series with reasonable certainty.

Determinations were made as above described upon nine samples of commercial desiccated suprarenals obtained from two firms and one sample of 1:1,000 solution of the active principle which had been in the laboratory some time. The results were as follows:

TABLE I.

Sample No.	Per cent. active principle.
362	0.6
363	0.6
364	0.6
365	0.8
366	0.2
367	0.8
368	0.4
369	0.4
370	less than 0.03
1:1,000 solution	0.03.

THE PHYSIOLOGICAL EXPERIMENTS.

In the quantitative physiological assay of epinephrine a number of different methods have been proposed, all being based on some physiological action of the base. Of these the one most commonly employed is that of determining the relative rise in blood pressure as compared with a given amount of the pure base; and a careful analysis of the other methods, the frog's eye test, the use of arterial strips and the minimum lethal dose,[7] indicates that with proper precautions this is also the most satisfactory and accurate. Of the several animals upon which blood pressure experiments might be carried out dogs appear to give the best results. For the purpose

[7] Schultz: Bull. 55, Hyg. Lab., U. S. P. H., and M. H. S., 1909.

of these tests full grown dogs of small size, 5 to 10 kilograms body weight, were chosen. They were anæsthetized by the injection of 0.015 gm. morphine sulphate per kilo, and sufficient ether given to insure complete anæsthesia during the operative procedure. The ether was then withdrawn although, if the animal showed signs of returning consciousness, especially as noted by irregularities in the blood pressure curve, it was again administered in small quantities during the course of the experiment. A cannula was introduced into the carotid and connected with a mercury manometer to secure a blood pressure tracing. Cannulæ were also introduced at the same level into both the right and left femoral veins for the injection of the drug to be tested. Both vagi were cut and artificial respiration maintained throughout the experiment.

To prepare the desiccated suprarenal extract for injection 50 milligrams were added to 40 c.c. Ringer solution and acidulated by the addition of 3 drops of 10 per cent. HCl. This was then slowly brought to a boiling temperature and allowed to cool for ten minutes, whereupon the solution was passed through a filter and the residue washed with a sufficient amount of warm Ringer solution to bring the total up to 50 c.c., thus making 1 c.c. of the solution represent 1 milligram of the desiccated gland. This procedure, however, was altered in the case of two samples, Nos. 366 and 370, owing to their relative inactivity. These samples were each made up so that 1 c.c. of the resulting solution equalled 5 milligrams of the gland, thus securing a suitable rise in pressure without using too large doses for intravenous injection.

The rise in pressure from equal doses of the same preparation varies in different animals and in the same animal from time to time during the experiment. This is probably due in large measure to a varying depth of anæsthesia and to varying sensitiveness of the vasomotor centre and the musculature of the arterioles. At any rate it becomes necessary in quantitative work to inject, alternately with the sample which is being assayed, a definite amount of the purified base, continuing in this until rises of equal height are obtained. As duplicate determinations there should then be injected ratios of the amount necessary to produce the same result and these larger or smaller amounts of the known and the unknown solution should likewise produce equal rises in pressure. Many of the necessary details of this method have been discussed by Dr. Schultz in Hygienic Laboratory Bulletins Nos. 55 and 61.

The solution of the purified base used in these experiments either was made up fresh every day or it was made up by diluting a stock 1 to 10,000 solution which was kept on ice to prevent deterioration. Dilutions of 1 to 50,000 and 1 to 100,000 were used and the injection of both the known and unknown solutions varied from 0.5 to 1.0 c.c.

The injections might possibly all be made through one cannula, but to obviate the necessity of washing out the residual solution each time, cannulæ are placed in the right and left femoral vein, one for injecting the known and the other the unknown solution. As injections made at different rates produce different results it is necessary to make both injections at as nearly the same rate and as rapidly as possible.

Two tables are given to show the method of arriving at the assay value of a given product.

TABLE II.

Sample desiccated suprarenal glands, No. 363, dog 7.6 kg. body weight; morphine sulphate 0.015 gm. per kg. subcutaneously. Both vagi cut. Epinephrine base in 1 to 100,000 acidulated Ringer solution. No. 363 suprarenal gland 1 mg. to 1 c.c. acidulated Ringer solution.

Time.	Preparation.	Dose.	Blood pressure before.	Blood pressure after.	Rise in millimeters.
11.48	Epinephrine	0.5 c.c.	166	206	40
11.51	363	0.5 mg,	164	204	40
11.56	363	0.5 "	162	200	38
12.02	Epinephrine	0.4 c.c.	156	192	36
12.05	363	0.4 mg.	156	192	36
12.12	Curare				
12.17	Epinephrine	0.6 c.c.	152	188	36
12.19	363	0.6 mg.	148	182	34
12.23	363	1.0 "	144	190	46
12.26	Epinephrine	1.0 c.c	138	182	44
12.29	363	1.0 mg.	140	186	46

It is easily seen from the above record that 1 milligram of the desiccated gland gave the same rise as 1 c.c. of a 1 to 100,000 epinephrine solution, or 0.01 milligram estimated as the base. The desiccated gland therefore contained 1 per cent. of the base.

Table III further illustrates the method of arriving at the assay value.

TABLE III.

Legend the same as for Table II. Sample No. 368 was used, 1 milligram to 1 c.c.; Epinephrine solution 1 to 100,000 solution.

Time.	Preparation.	Dose.	Blood pressure before.	Blood pressure after.	Rise in millimeters.
1.30	Epinephrine	0.6 c.c.	128	154	26
1.33	368	0.6 mg.	128	150	22
1.38	Epinephrine	0.6 cc.	126	154	28
1.40	368	0.7 mg.	124	150	26
1.43	Epinephrine	0.5 c.c.	124	150	26
1.49	"	0.75 c.c.	132	164	32
1.52	368	1.0 mg.	122	150	28
1.54	368	1.0 "	120	148	28
1.57	Epinephrine	0.7 c.c.	122	152	30
2.01	368	0.8 mg.	126	146	20

From this table it will be noted that the ratios of 0.5 of the known to 0.7 of the desiccated gland solution and 0.7 to 1.0, respectively, gave like rises in temperature. One milligram of the desiccated drug therefore contained the amount of epinephrine base in 0.7 c.c. of the known solution, 0.007 or 0.7 per cent.

These two tables are from one of the final experiments after the approximate values of the unknown had been worked out.

Below is given a table showing the results obtained from the various samples by the physiological and the colorimetric method of assay.

TABLE IV.

Sample No.	Per cent Active Principle by Colorimetric Method	Physiological Method
362	0.6	1.0
363	0.6	1.2, 1.0, 1.0
364	0.6	1.0
365	0.8	1.1, 1.1
366	0.2	0.3, 0.2
367	0.8	1.1, 1.0, 1.1
368	0.4	0.7
369	0.4	0.7
370	less than 0.03	0.04
1 : 1000 solution	0.03	0.035

From this table it will be seen that fairly large differences exist in the two sets of values; however, it will be noted that a close parallelism exists between them. The results by the physiological

method being some 30 per cent. higher in most cases. We are unable at present to account for this, especially since the same sample of the pure ash free active principle was used as the basis for the determinations by the two methods. Apparently the most plausible explanation is that referred to above, namely, that the yellowish extractive material yielded by the samples is the cause of the lower readings by the colorimetric method. In spite of these variations, however, we believe that this test is by far the most satisfactory one at present available and furnishes a means for closely estimating the relative value of different lots of desiccated suprarenal glands and 1 : 1000 solutions of the active principle. We hope to be able in the near future to extend our experiments to many other samples, both of the desiccated glands and the commercial 1 to 1000 solutions and trust that we will be able to remedy the cause of the present differences in values obtained by the two methods.

In conclusion special attention should be called to the very wide differences in activity found for the various commercial samples of desiccated glands and the considerable diminution in strength of a 1 : 1000 solution of the active principle. Such wide variations have so far not been reported for the commercial glands and were not expected when we undertook these experiments. They illustrate very forcibly the need of just such a simple method of control of this product as is described in the present paper.

ON THE PHARMACOPŒIAL ASSAY OF CITRAL IN LEMON OIL.

By J. R. Rippetoe, P.D., and Louis E. Wise, Ph.D.

The determination of Citral has for several years past been the subject of considerable investigation. In 1906 Chace [1] proposed a rapid method for the estimation of this aldehyde, which is applicable to the analysis of lemon oils and extracts and which time has shown to be admirably suited to the needs and requirements of the importer of the essential oils. Somewhat more recently Bennet,[2] modifying a method of Walther,[3] has suggested a means of analysis

[1] *Journal of the American Chemical Society*, **28**, 1472.
[2] *Analyst*, **34**, 1417.
[3] *Pharm. Centr.*, **40**, 621.

depending on the use of hydroxylamine hydrochloride, and Romeo [4] outlined a titration method which was published by the Messina Chamber of Commerce and successfully followed in the analysis of a number of pure oils.

In 1909 Hiltner [5] published the description of a colorimetric method which together with that of Chace [1] has been outlined by Leach in his *Food Inspection and Analysis.*

The Pharmacopœial assay of oil of lemon is without doubt known to all pharmacists, chemists and analysts. In our hands, with careful manipulation and some degree of patience, it has given fair but not satisfactory results. We have found the end point very uncertain and we have always felt that the assay was extremely tedious, demanding much of the analyst's time and attention and frequently causing trouble and annoyance.

One of the chief sources of trouble is the sodium sulphite used in the analysis. During the course of some routine work we were much surprised to obtain results which could not be accounted for until we examined the reagent in question. Two analyses of the salt showed that it contained about *4 per cent. of sodium sulphite, instead of being chemically pure as the label stated.* The rest had, with amazing rapidity, been oxidized to the sulphate. We studied this matter a little more closely and found that another sample of sulphite, containing water of crystallization, which had been assayed in June, and found to comply with the U S. P. requirements, contained approximately 76 per cent. of $Na_2SO_3 7H_2O$ in September. Elvove in a previous number of this journal [6] has recorded a thorough investigation of this subject. Our only comment is that all sulphite should be roughly assayed by the U. S. P. method just before using and that an amount of salt should be taken, which contains the equivalent of 10 grams of anhydrous sodium sulphite or 20 gms. of sodium sulphite containing 7 molecules of water of crystallization for each 100 cubic centimetres of water used in making up the solution.

Another debatable point involves the amount of rosolic acid T. S. which is to be used in the assay. Our own experience has shown that the indicator should be added at intervals during the

[4] *Chem. Druggist,* 74, 81.
[5] *J. Ind. and Eng. Chem.,* 1, 798.
[6] THIS JOURNAL, 82, 211.

course of the analysis until further addition causes no marked pink color in either the control or the test, after heating for a reasonable length of time in a water bath which is boiling briskly. We have found it best to add the rosolic acid solution from a calibrated 1 c.c. pipette.

The end point is, as we have suggested, by no means sharp and brings a large personal error into play. After summing up the points of weakness of this assay, and adding to them the fact that Citronellal may be determined and reported as Citral, we reached the conclusion that, as a means of roughly approximating the true Citral content, the method was entirely too involved and laborious.

In trying to find a suitable substitute we have made some tests using the method outlined by Chace and also the one described by Hiltner.

Chace's fuchsin-sulphurous acid method was followed without great modification. (We found it convenient to use a refrigerator with a temperature of 13° to 13.5° C. and to make our comparisons at the end of 15 to 20 minutes.) For a description we refer the reader to Chace's original article or to Leach's *Food Inspection and Analysis,* page 866. Nessler tubes were used instead of a colorimeter, and varying amounts of a standard solution of pure Citral in aldehyde-free alcohol were employed for comparing color values. The method is rapid and gives results which are in general slightly higher than those given by the U. S. P. assay. Unfortunately this excellent and rapid method involves the use of aldehyde-free alcohol, a reagent which cannot be obtained in a short time. This handicaps the analyst who assays but few samples of the oil and who is called upon to report quickly. Under these circumstances he has little time to wait until the aldehyde has been removed. (We found that more than eight hours' boiling under reflux and that considerably more than 5 gms. of metaphenylene diamine hydrochloride were necessary to eliminate most of the aldehyde in 1000 c.c. of 95 per cent. grain alcohol. Even then our distillates gave a distinct aldehyde reaction.)

Hiltner's method with slight changes has, however, proven sufficiently satisfactory to warrant a brief outline of the procedure followed in this laboratory. A more detailed description may be obtained from the author's original paper.

A standard solution of Citral made by weighing accurately between 50 and 70 mgms. of pure Citral and making up to 50 c.c. with

alcohol was found satisfactory. Each cubic centimetre then approximates 1 mgm. of Citral. (100 to 130 mgms. in 50 c.c. may be used and smaller aliquot portions taken for the test.)

Ninety-five per cent. alcohol without previous purification was used in all the operations herein recorded. A 1 per cent. solution of metaphenylene diamine hydrochloride in diluted alcohol was employed as reagent. This solution was shaken with, and filtered through bone black before using.

About 1.5 c.c. of oil of lemon is measured into a 50 c.c. weighed flask, accurately weighed, and made up to the mark with 95 per cent. alcohol, stoppered and thoroughly shaken. From two to four c.c. of this solution are then accurately measured from a pipette calibrated to 1/100 c.c. into a Nessler tube, 10 c.c. of the filtered solution of metaphenylene diamine hydrochloride added, and the volume made up to the 25 c.c. mark on the tube, with alcohol. The same or a corresponding amount of standard Citral solution is then pipetted into another tube and treated in the same way. The solutions after shaking are compared by viewing them transversely and the stronger one is diluted with 95 per cent. alcohol until the reddish-yellow colors appear to be identical. The volumes are then measured and the subsequent calculations are based on the amount of Citral present in the standard. If these volumes vary more than 4 c.c., one from the other, the test should be repeated using a relatively smaller amount of the stronger solution. We have found it advisable to compare the colors of the solutions when approximately 3 to 5 mgms. of Citral are present in the standard. Two or three close readings, all of them made in volumes of approximately 25 c.c., should be obtained.

The method of calculating the results is comparatively simple. Taking as complex a case as possible:

Assume that each c.c. of the standard contains 1.2 mg. of Citral, and that there are 1.30 grams of lemon oil in 50 c.c. of an alcoholic solution. Then, if 3 c.c. of the standard and 3.2 c.c. of the solution of oil of lemon are used in the test—and if the *final* volume of the standard is 26 c.c. (after colorimetric comparison and dilution) and provided the other solution measures 25 c.c.—

Each c.c. of the *diluted standard is equivalent to each c.c. of the other solution*, and contains $\frac{1.2 \times 3}{26}$ mgs. of Citral.

The *total final* volume of the unknown (oil of lemon) solution

then contains $\left[\frac{1.2 \times 3}{26}\right]$ x 25 or 3.46 mgs. of Citral.

In other words 3.2 c.c. of the original solution of oil of lemon contain 3.46 mgs. of Citral and *3.2 c.c. of this same solution also contain 83.2 mgm. of* OIL $\left(\frac{1.300}{50} \times \frac{3.2}{1} \times \frac{100}{1} = 83.2\right)$

Then $\frac{3.46 \text{ mgm. Citral}}{83.2 \text{ mgm. of oil}} \times 100 =$ Percentage Citral in the oil $= 4.16$ per cent.

It may be of interest to note the close readings which can be obtained by the metaphenylene diamine method. They are shown in Table I.

TABLE I.

Sample number	Per cent. citral (Hiltner's Method)
IIa	3.88; 3.89.
IIb	4.19; 4.22; 4.07.
9469	4.05; 3.89.
9427	4.11; 4.11.

Table II shows the Citral content of the oils as determined by the three methods.

TABLE II.

Sample number	By U.S.P. Method	By Chace's Method	By Hiltner's Method
II	4.17 per cent. 4.44 per cent.	4.20 per cent.	4.16 per cent. 3.89 per cent.
9469	4.30 per cent.	4.50 per cent.	3.97 per cent.
9427	4.04 per cent.	4.35 per cent.	4.11 per cent.

As a result of this limited investigation, we beg to recommend that the Hiltner method be further studied, and that if possible, it be substituted for the pharmacopœial sulphite method now in use. The former is apparently more accurate (since it does not determine the Citronellal and thus introduce a positive error) and is undoubtedly much more rapid and far less troublesome. The results obtained may naturally be somewhat lower and if the method is adopted it may be found necessary to change the U. S. P. requirements from 4 per cent. to approximately 3.8 per cent. of Citral.

Research Department,
SCHIEFFELIN & Co., New York.
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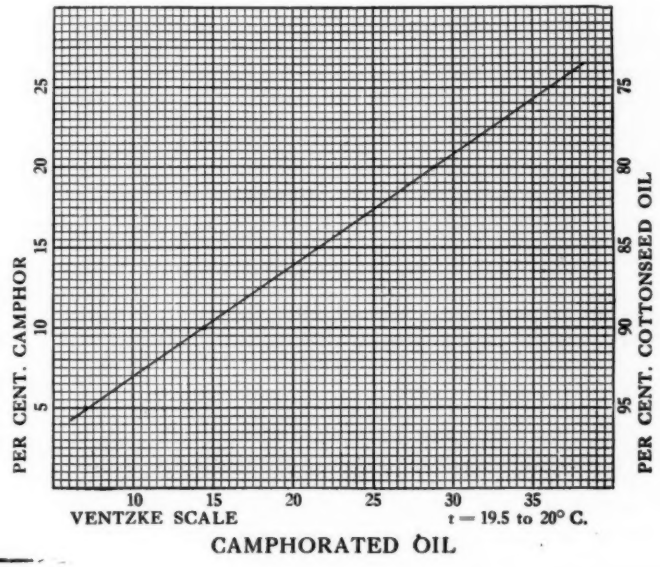
FACTORY CONTROL OF CAMPHORATED OIL WITH THE AID OF THE SACCHARIMETER.

By Horace North,

Analyst with Lehn & Fink, New York.

The formula for camphor liniment official in the U. S. P. VIII requires that 200 gms. of coarsely powdered camphor be dissolved in 800 gms. of cottonseed oil. Solution is hastened by applying a gentle heat. By this process some of the camphor is volatilized, the loss varying with the degree of heat and the time necessary to effect solution, so that the finished preparation contains less than 20 per cent. of camphor. It is good policy, however, in order to



avoid disputes, for the manufacturer to furnish an oil containing fully 20 per cent. of camphor. The present article deals with a simple means for controlling the strength of the product.

Five solutions were prepared containing 5, 10, 15, 20 and 25 gms. of camphor, respectively, and sufficient cottonseed oil in each case to make 100 gms. Refined Japanese camphor of medicinal quality and high-grade cottonseed oil were employed. The camphor was granulated as finely as possible in a mortar. The ingredients were weighed into 300 c.c. Erlenmeyer flasks and the latter,

securely corked, were shaken at frequent intervals. By this procedure no camphor was lost and at the end of two days it was completely dissolved. Observations were then made in a Schmidt and Haensch saccharimeter. A 100 mm. tube was employed. The temperature during the readings varied from 19.5° to 20° C. The left field showed a reddish color which deepened with increased concentration of the camphor, so that, while the reading on the 5 per cent. solution was perfectly distinct, the observations became more difficult until with the 25 per cent. solution the precise reading was in doubt. Five to fifteen independent observations were made on each solution, according as the reading was more or less distinct. The averages on the five solutions were, respectively: + 7.0 + 14.5, + 21.7, + 28.9, + 36.2. With these data a graph was plotted.

In order, then, to examine lots manufactured in the laboratory, it is only necessary to fill a 100 mm. tube with the sample and observe the reading in the saccharimeter at or near 20°C. Reference to the graph indicates the percentage of camphor.

LIQUOR MAGNESII CITRATIS.

By M. D. Allen.

The manufacture and preservation of liquor magnesii citratis is a simple matter, yet one which gives the average retail druggist a great amount of trouble, as I have learned by experience.

The Pharmacopœial method, with which you are all familiar, gives an excellent product, if you can prepare it freshly as required, or if you can accurately gauge your demands for not over 24 or 36 hours. Either course is hardly practical, so that some method must be employed whereby the product can be preserved in good condition, for not only one day but several days, or weeks if desired.

I have used various methods without much success. The first which I tried was to dissolve the acid and magnesium carbonate in boiling water, filtering, adding the required amount of syrup and oil of lemon—for the flavor—and filling the bottles which had been thoroughly cleaned. I found, however, that at the end of about 24 hours a flocculent fungous growth would form and constantly increase. This method was then abandoned.

I next used the same process, but substituted the required amount of sugar, thinking that the fungus was in the prepared syrup. The results, however, were practically the same as before.

Later, I dissolved the acid in a small amount of water at a boiling temperature, added the magnesium carbonate and oil of lemon. After the reaction was completed the syrup was added and then a sufficient quantity of sterile water. The product was then heated to boiling and filtered. The bottles were previously prepared by boiling in a solution of sodium carbonate and thoroughly rinsed. These were then filled with the warm solution of citrate of magnesia. This product lasted nearly three days, but at the end of that period the fungus started to form just the same.

Next I tried adding a small amount of purified talcum, using the same process as the last mentioned. The product remained in good shape for nearly two weeks and it seemed that this would be the proper method, but precipitation began in that time and now after ten months you can see the results.

The next effort was to find out if the oil of lemon, which heretofore I had used directly was at fault. To get away from that, I made a flavoring tincture with enough alcohol to act as a preservative, but while this improved the flavor, it did not improve the keeping qualities.

The next effort was the one which seems so far to have been successful. The acid was dissolved in a small amount of hot water, then—previously mixed—the magnesia carbonate, sugar, purified talc, and flavoring tincture were added. When the reaction is completed add sufficient water and filter. The bottles were filled and closed. Then placed in an ordinary wash boiler, covered with water and boiled for about 30 minutes. Here is a sample treated in that manner, which has been on my shelf with no precautions as to care for five months, and yet it is as clear and effective as the day it was made.

I have also tried several sterilizations at 24-hour intervals, of the same lot, but find that one sterilization does the work as well as two or three, as can be seen by these samples which are plainly marked.

The excessive color I find is due to the frequency and the length of the sterilizations. This sample here is one taken from the regular stock, which is ready to have the potassium bicarbonate added and

be sent out to the customer. You will notice that there is much less color present than in the other samples.

℞, Citric Acid ..... ℥i
Magnesium Carbonate ..... ℥ss
Flavoring Tincture ..... ♏xxiv
Sugar ..... ℥ii
Purified Talcum ..... grs. xlviii
Aqua ..... qs.ad fl℥xii

U. S. P. Total Citric Acid	518 grs.	} Difference	80 grs.
My Formulæ	438 "		
U. S. P. Magnesia	231 "	} "	12 grs.
My Formulæ	219 "		

Flavoring Tincture consists of: Oil of Lemon, fl ʒ vi.; Oil of Orange fl℥ iv; Tr. of Ginger fl℥ vi; and Alcohol q.s. ad fl℥ iv.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By M. I. Wilbert, Washington, D. C.

The tentative report of the Executive Committee of Revision on the scope of the U. S. P. IX has attracted considerable attention and has been liberally commented on both in medical as well as pharmaceutical journals. While it can hardly be expected that the individual substances agreed upon for admission to the coming edition of the U. S. P. will be endorsed by all, the comments that have appeared up to the present time have been quite favorable.

The Committee on National Formulary is calling renewed attention to some of the formulas that it is proposed to add to the forthcoming edition of the National Formulary. While all of the formulas have been published previously their systematic publication with the direct invitation for comment and criticism before final publication is being favorably commented on by editors of pharmaceutical journals and the resulting publicity should contribute materially to make the N. F. IV more nearly free from glaring errors of omission or commission than any of its predecessors.

The growing influence of the Council on Pharmacy and Chem-

istry of the American Medical Association on the progress of pharmacy in these United States is well illustrated by the nature and the importance of the references to the work of that Council as reported in the *Journal of the American Medical Association.* The American pharmacist who does not keep in touch with the progress of this work is missing an opportunity to prepare for the new pharmacy which is bound to result from the time and thought that is being devoted to materia medica and therapeutics by the leading minds in medicine today. The repeated evidence that there is need for efficient control of all important active medicaments will, in time at least, lead to the recognition that this control can best be exercised at the time of dispensing because no matter how efficient an article may have been when made, if deteriorated, it may be not alone worthless but even harmful.

No one agency, in this or any other country, is doing more to call attention to the need for the efficient control of medicines and the desirability of developing a thorough knowledge of the possibilities as well as the limitations of various drugs than is the Council on Pharmacy and Chemistry, and the details of the work referred to in the following pages will be found well worth studying at length in the original.

The American Druggist for many years issued twice a month, appears in October in an enlarged form with the announcement that in future it will be issued as a monthly.

NEW YORKER DEUTSCHER APOTHEKER VEREIN.—This widely known and in many ways unique organization celebrated its Sixtieth Anniversary on September 28, 1911, under peculiarly pleasing circumstances. The "Kommers" held on that date was attended by one of its founders and now honorary president, the venerable Gustav Ramsperger, also by representatives of the medical as well as pharmaceutical professions who felicitated the organization on its long and honorable career.

N. A. R. D.—The thirteenth annual meeting of the National Association of Retail Druggists held at Niagara Falls on September 11 to 14, 1911, was well attended and unusually harmonious for an association which endeavors to safeguard the business interests of so large a number of members in different sections of the country. The financial condition of the Association is more satisfactory than at any period in its history, the Treasurer reporting the comfortable surplus of $14,000 in cash on hand.

The resolutions adopted cover a variety of subjects but are conservative and will go far to reinforce the Association in the place that it has established for itself. H. C. Shuptrine, of Savannah, Ga., was elected President, and Thomas H. Potts re-elected Secretary.

N. W. D. A.—The meeting of the National Wholesale Druggists' Association held in New York, October 10 to 13, 1911, appears to have been an unusually successful one both as to attendance and results. The address of President Schieffelin contained a powerful arraignment of the illegitimate sale of habit forming drugs and a plea for a national law to regulate interstate traffic in habit forming drugs.

Other features of the proceedings that are of interest to pharmacists at large are the reports of the several standing committees and the addresses by Dr. True and Prof. Remington. Dr. True reviewed the difficulties that have been met with in drug plant cultivation particularly of indigenous drugs, and called attention to some of the drugs that are being successfully cultivated in a larger way.

Prof. Remington presented an interesting report on the progress of the revision of the Pharmacopœia of the United States, the probable scope of the U. S. P. IX and the interest that is being evidenced in the revision generally.

HANBURY GOLD MEDAL.—The adjudicators of the Hanbury Fund have awarded the gold medal to M. Léger, a member of the Committee of Revision of the French Pharmacopœia whose work in connection with the active constituents of drugs has made him well known to chemists all over the world. —*Pharm. J. Lond.*, 1911, v. 87, p. 470.

DR. WILEY.—An editorial (*J. Am. M. Ass.*, 1911, v. 57, p. 905) in commenting on the charges against Dr. Wiley says: "When the charge against Dr. Wiley was first made public even his friends supposed that it could be at least sustained on a technicality. The investigation has brought out the fact that Dr. Wiley was not even guilty of the trivial technical violation that was claimed. The editorial also calls attention to some of the details brought out in the course of the investigation which are published in this and other issues of the *Journal of the A. M. A.*"

Another editorial (*Ibid.*, p. 1061) in calling attention to the decision reached by President Taft in the "Wiley case," says: "Dr.

Wiley's enemies are opposed to him because he represents a principle—that of protection to the consumer. They would be equally antagonistic to any other individual holding the same position and actuated by the same ideas."

U. S. P. Revision.—An editorial (*J. Am. M. Ass.*, 1911, v. 57, pp. 989-991) comments on the proposed scope of the U. S. P. IX and the relation of this first report of the Executive Committee of Revision to the practice of medicine. Measured by the guiding principle adopted by the present Committee of Revision, namely, that admission to or retention in the Pharmacopœia should be determined by "therapeutic usefulness or pharmaceutic necessity," the present report of the Committee of Revision is characterized as being disappointing. The editorial concludes that the one encouraging feature is that the tide appears to have turned and that the degeneration which Dr. Jacobi said was noticeable in recent revisions seems to have been checked, for a Pharmacopœia constructed on the lines foreshadowed by the first report of the Executive Committee of Revision is certainly a decided improvement over its immediate predecessor and should encourage physicians to renewed activity and interest.

Prescription Writing.—The editor of the Therapeutics column (*J. Am. M. Ass.*, 1911, v. 57, p. 1133) in an introduction to a series of articles on prescription writing presents a number of suggestions that should be of value to the pharmacist who is anxious to improve his prescription business, also discusses a number of questions that should be of interest to the pharmacist himself, from a professional point of view. Thus the following comment on the scope of the forthcoming Pharmacopœia of the U. S. P. is well worth considering:

"The proper use of drugs that have physiologic activities being acknowledged helpful and often curative, it is self-evident that we expect and demand a standard of strength and of purity of such drugs as laboratory and clinical determinations have proved valuable. Consequently we await the ninth revision of the United States Pharmacopœia with hope and faith that it will furnish the standards of useful drugs, and trust that it will not officialize and attempt to standardize drugs of no therapeutic value and of no 'pharmacal' necessity. A standard book that contains many useless articles insults its articles of value and loses them in a fog of uselessness."

ETHICAL PROPRIETARIES.—M. E. Fussell, in a paper on the dangers of certain ethical proprietaries to both physicians and public, calls renewed attention to the fallacy of using ready-made mixtures, be they proprietary or official. He enumerates the misleading claims that are made in connection with a number of the more popular proprietary medicines and points out some of the dangers attending their use.—*J. Am. M. Ass.*, 1911, v. 57, pp. 1194–1198.

THE RESPONSIBILITIES OF THE DISPENSER.—During recent months a number of articles in medical journals have called more or less direct attention to the responsibility of the pharmacist for the nature and purity of the medicaments dispensed by him on physicians' prescriptions. There can be no doubt but that members of the medical profession are devoting an increasing amount of thought to the problems that are involved and that pharmacists in the near future will be required to comply with the requirements naturally expected of them or submit to additional and possibly irksome restrictions in the conduct of their business.

Among the many subjects that have been recently discussed it will suffice to call attention to but a few, so as to point out the features to which attention should be directed in an effort to solve the problems now confronting American Pharmacy.

THE PRESCRIPTION FROM THE PHYSICIAN'S STANDPOINT.—Dr. Thomas F. Reilly, in discussing this subject, expresses the opinion that the confidence of the medical profession in the integrity of the average pharmacist has been pretty generally shaken. He is afraid that until the pharmaceutical societies take the accusations that are being made against retail druggists in hand and punish without fear or favor the distrust now existing will grow.

He thinks it would be quite feasible for the representative medical societies to certify to the reliability of a number of pharmacists who are willing and able to supply medicaments of the required standard.—*American Medicine*, 1911, v. 17, pp. 528–532.

LACK OF DRUG STANDARDIZATION.—Dr. Walter Eugene Hurley expresses the belief that the loss of confidence and the resulting indifference toward drug therapy has been brought about by the clinical failures seen every day by the average physician. He further asserts that the extent of variance from the requirements of the U. S. P. has been shown to be so great as to leave no doubt as to the unreliability of drugs dispensed in the routine way. He also

quotes extensively from the report of a recent investigation into the manner and accuracy of dispensing by New York City pharmacists, and points out that this report places a number of pharmacists in a very unpleasant light.—*American Medicine,* 1911, v. 17, pp. 541–543.

DIGEST OF COMMENTS.—A book review commenting on the uses of the Digest of Comments on the Pharmacopœia and the National Formulary points out that these bulletins serve to indicate the nature and the kind of remedies that are being used and actively discussed by physicians in different parts of the world. Not the least interesting of the truths that have been evidenced in this connection is the fact that the really active and efficient drugs are universally used by all classes of practitioners. It is also evident that the literature relating to the use of many of the less well established drugs is based on observations that are so unreliable or at least questionable that the mockery of their continuance as official articles must be apparent to every well trained medical man.—*J. Am. M. Ass.,* 1910, v. 57, p. 1398.

COMPARATIVE PURITY OF MEDICAMENTS.—Puckner and Warren, in reporting their examination of calcium phenolsulphonate, point out that the results of the examination of this substance further illustrate what other examinations in the Chemical Laboratory of the American Pharmaceutical Association have so often shown, and that is that commercial products which are but little used and for which there are no authoritative standards for strength and purity are also invariably unreliable in composition.—*J. Am. M. Ass.,* 1911, v. 57, p. 1384.

BRITISH PHARMACOPŒIA.—The Committee of Reference in Pharmacy has issued a further report containing suggestions for the revision of the British Pharmacopœia. This report is abstracted in the *Chemist and Druggist* (August 26, 1911, v. 79, pp. 354–358) and also commented editorially (*Ibid.,* pp. 351–352). The present installment includes many, if not all, of the changes that are involved in an attempt at compliance with the provisions of the Brussels Protocol, and it is gratifying to learn that with a limited number of minor exceptions and the recognized reservation that liquid preparations are to represent weight volume per cent., there is a general tendency to conform strictly with the requirements of the International Treaty.

The editor, in commenting on the revision of the Ph. Brit.,

points out that the reports as a whole are calculated to give pharmacists a very good idea of the progress of pharmacy within the last few years and by comparing the various recommendations and suggested monographs one will find little difficulty in constructing a skeleton of the new Pharmacopœia which, long overdue, should be published not later than 1912.

The *Pharmaceutical Journal* (London, 1911, v. 87, p. 296) in commenting on the third report made by the Committee of Reference in Pharmacy, says: "It is expected that the pharmaceutical and medical editors of the pharmacopœia will now undertake the preparation of a draft text for the consideration of the Pharmacopœia Committee. This work, it is said, will devolve upon Dr. Nestor Tirard and Prof. Greenish, and may be expected to occupy some considerable amount of time."

BRITISH PHARMACEUTICAL CODEX.—The new British Pharmaceutical Codex is now in press, and a sample monograph describing ergot and its preparations (*Pharm. J.*, London, 1911, v. 87, pp. 299–300) gives some indication of the extensive changes that have been made in the style and make up of the book.

ASH CONTENT OF DRUGS.—John C. Umney, commenting on the paper on the ash content of drugs (AM. J. PHARM., 1911, v. 83, pp. 474–478) thinks that the author's deductions from the records he quotes are hardly justified. Umney believes that roots, barks and even leaves are capable of control by ash content and the matter of sampling offers no insurmountable difficulties in connection with drugs of high standard to be used as medicine.—*Brit. & Col. Drug.*, 1911, v. 60, pp. 342–343. See also editorial *Ibid.*, p. 339.

ACETYLSALICYLIC ACID.—Seel and Friederich, in the first installment of a report on compressed tablets, present their result in connection with tablets of acetylsalicylic acid, and conclude that the commercial tablets are far from satisfactory and go far to account for the repeated complaints from physicians regarding the variable action of this drug.—*Pharm. Zentralh.*, 1911, v. 40, pp. 1055–1062.

ACETYLSALICYLIC ACID.—A news note quotes from a report on the comparative prices of acetylsalicylic acid and aspirin in Paris and London. In France acetylsalicylic acid sells for about $1.33 per kilo (2.2046 pounds), while aspirin, which is a proprietary article, sells for $6.95 per kilo in 2 kilo lots or $10.13 per kilo in smaller lots.

In England the price of acetylsalicylic acid varies from 49 to 55 cents per pound. The name aspirin is still protected by registra-

tion. It sells at wholesale for $4.38 per pound and may be bought in single ounces at from 35 to 40 cents per pound.—*Oil, Paint, and Drug Reporter,* 1911, v. 80, Aug. 28, p. 37.

ADALIN.—Is brom-diethyl-acetylcarbamide prepared by the action of bromdiethyl acetyl bromide on urea. It occurs as an almost colorless and odorless crystalline powder with a melting point of 116° C. Adalin dissolves readily in alcohol and the other organic solvents. It is difficultly soluble in water. The product is said to be an efficient and prompt sedative, reducing excitement and promoting sleep in conditions in which a powerful hypnotic is not required.—*J. Am. M. Ass.,* 1910, v. 57, p. 1132.

BISMON.—Bismon is claimed to be a preparation of colloidal bismuth meta-hydroxide containing about 20 per cent. of metallic bismuth. Bismon occurs as a light brown granular substance forming with water fairly stable opalescent colloidal suspensions. It is said to have the action of other preparations of bismuth and is given in doses of 0.5 gm. in water.—*J. Am. M. Ass.,* 1911, v. 57, p. 1614.

BULGARA TABLETS, as described by the Council on Pharmacy and Chemistry, consist of the slowly dried cultures of Bacillus bulgaricus mixed with milk-sugar and starch, each tablet weighing 5 grains and containing a sufficient number of virile organisms to effect the souring of a pint of sterile milk in less than 20 hours.—*J. Am. M. Ass.,* 1911, v. 57, p. 1132.

CALCIUM HYPOPHOSPHITE.—Rupp and Kroll outline a titrimetric method for determining hypophosphorus acid in calcium hypophosphite by using the potassium bromate and bromide solution directed by the Ph. Germ. V for the determination of phenol.—*Archiv. d. Pharm.,* 1911, v. 249, pp. 493–497.

CALCIUM PHENOLSULPHONATE.—The Council on Pharmacy and Chemistry describes calcium phenolsulphonate as the neutral calcium salt of para phenolsulphonic acid. It occurs as a white or faintly pinkish white, almost odorless powder having an astringent, bitter taste. At high temperature the salt chars, emitting inflammable vapors having the odor of phenol and finally leaves a residue of calcium sulphate. Calcium phenolsulphonate is easily soluble in water and in alcohol.—*J. Am. M. Ass.,* 1911, v. 57, p. 1367.

CAPSICUM.—Harry E. Sindall reports a number of ash determinations on large lots of capsicum, and points out the impossibility of keeping the commercial product down to the limits given in Circular No. 19. This circular allows a total maximum ash content of

6.5 per cent. and 0.5 per cent. acid insoluble residue. Sindall thinks the standard should be raised to 7 per cent. total ash and 1 per cent. acid insoluble residue.—*J. Ind. and Eng. Chem.*, 1911, v. 3, pp. 753–754.

DIGITALIS AND ALLIED DRUGS.—Worth Hale reports a study of the effect of the digestive secretions on the activity of digitalis, digitoxin, digitalein and strophanthin. He concludes that while there is an appreciable deterioration of the several substances the rate of decomposition is such that it need not be taken into account in therapeutics.—*J. Am. M. Ass.*, 1911, v. 57, pp. 1515-1517.

EPINEPHRINE PREPARATIONS.—A report of the Council on Pharmacy and Chemistry points out the desirability of having a standard for epinephrine preparations recognized by manufacturers so as to insure uniformity of composition. The report outlines a method for assaying preparations of this type and suggests that the strength of epinephrine preparations be stated in terms of pure epinephrine and the strength of the preparations should not vary more than 15 per cent. from the strength claimed, when tested according to the method outlined in the report in comparison with a known quantity of pure epinephrine.—*J. Am. M. Ass.*, 1911, v. 57, pp. 1149–1150.

ERGOT.—Edmunds and Hale, in Bull. No. 76, Hyg. Lab., U. S. P. H. and M.-H. S., discuss the physiological standardization of ergot. They review much of the literature relating to the standardization of ergot, compare the several methods that have been suggested from time to time, report on a number of commercial products, and conclude that for practical purposes the cock's comb method is the preferable one at present. They also suggest that ergot preparations be marked with the date of manufacture, and that until more reliable methods of manufacture are found it would be wise to exclude all claims to permanency of ergot liquid preparations.

An editorial (*J. Am. M. Ass.*, 1911, v. 57, p. 1211) in commenting on the Bulletin by Edmunds and Hale points out that the primary object of the work was to test the comparative value of the several methods of assay. Incidentally, however, the results show that the available preparations of this drug are far from being uniformly reliable or fully satisfactory. Much of the deterioration noted is no doubt the result of aging. The editorial concludes with the suggestion that to insure uniformity in preparations of ergot and digitalis it may be desirable to have the U. S. Government

establish a system of continuous control similar to that which has proven so satisfactory in the case of antitoxins and vaccine virus.

ERSEOL is quinoline sulpho-salicylate, which forms well defined white prisms with an acid reaction, and is easily soluble in warm water. It is recommended as a remedy for rheumatism and similar troubles.—*Chem. and Drug.*, London, 1911, v. 79, p. 348.

FERRO-SAJODIN is described as basic ferric iodobehenate. It is said to contain about 5.7 per cent. of iron and about 25 per cent. of iodine. It occurs as a reddish brown powder unctuous to the touch. It is insoluble in water, soluble in chloroform and ether. Ferro-sajodin is said to have the action of iodides and of iron. It is claimed to be more stable and palatable than ferrous iodide and not to injure the teeth or disturb the gastrointestinal tract.—*J. Am. M. Ass.*, 1910, v. 57, p. 1132.

HELGOTAN, a bromo tannin methyleneamido-bromide, is recommended as a dusting powder of high antiseptic value.—*Chem. & Drug.*, London, 1911, v. 79, p. 348.

LANOLIN.—An editorial (*J. Am. M. Ass.*, 1911, v. 57, p. 906) points out that as long ago as 1902 a court decision established the fact that lanolin became a non-proprietary name when the patent on the product expired. To help remove the misapprehension that exists regarding the use of this word the Council on Pharmacy and Chemistry has decided to list it as a synonym for the official title.

The editor (*Pharm. Journ.*, London, 1911, v. 87, p. 401) in commenting on the proposed use of lanolin in N. N. R. as a synonym for adeps lanæ hydrosus points out that the word lanolin is not now protected in Great Britain and appears in the British Pharmaceutical Codex as a synonym for hydrous wool-fat.

MORPHINE.—Thorburn, A. D., discusses the estimation of morphine with phenyl-ethyl alcohol. The author believes the method to be a practical one and even the comparatively high price of the phenyl ethyl alcohol does not appear to him to be prohibitory. An aqueous solution of morphine is made alkaline and shaken with a mixture of phenyl-ethyl alcohol, which is then partially evaporated and titrated.—*J. Ind. and Eng. Chem.*, 1911, v. 3, pp. 754–756.

OPIUM.—An editorial (*Chem. & Drug.*, 1911, v. 79, p. 384) asserts that next to China the United States consumes more opium than any other country. The total imports into the United States, for the fiscal year ending June 30, 1911, are said to be 629,842 pounds, as compared with 449,239 pounds in the previous fiscal year. It

is generally believed that a large percentage of the drug sold in the United States is used either by persons who have acquired the drug habit or, to a minor degree, for smoking purposes.

PANKREON.—Tannin-pancreatin compound. A mixture containing the active tryptic, diastatic, and steatolytic ferments of the pancreas and about 8 per cent. of tannin. Pankreon is a dry, grayish, odorless powder of a slightly acidulous taste. It is soluble in alkaline liquids and practically in waters and acid liquids.—*J. Am. M. Ass.*, 1911, v. 57, p. 1455.

PEPSIN AND PANCREATIN IN SOLUTION.—A. Zimmerman reports a number of laboratory studies of combinations of pepsin and pancreatin and concludes that these ferments exercise no destructive action upon one another, and that with the proper degree of acidity they can be kept in the same solution permanently, the loss of activity noted by other observers having been due, entirely, to the reaction of the solution and to the degree of such reaction.—*J. Ind. and Eng. Chem.*, 1911, v. 3, pp. 750–753.

METALLIC PEROXIDES.—The Council on Pharmacy and Chemistry describes a number of metallic peroxides which are compounds in which the hydrogen of hydrogen peroxide has been replaced by metals and which are readily decomposed with liberation of hydrogen peroxide, or of oxygen in an active state. The commercial products are usually mixtures containing but a limited amount of real peroxide; for example, commercial "magnesium peroxide" contains but about 15 per cent. of magnesium peroxide, while commercial "sodium peroxide" contains about 75 per cent. of sodium peroxide.—*J. Am. M. Ass.*, 1911, v. 57, p. 1209.

QUININE TANNATE is described by the Council on Pharmacy and Chemistry as the tannate of the alkaloid quinine containing from 29 to 35 per cent. of quinine. Quinine tannate has the action of other salts of quinine, but on account of its insolubility its action is less certain than the more soluble quinine salts. The lack of bitterness renders it a useful preparation for administration to children.—*J. Am. M. Ass.*, 1911, v. 57, p. 1287.

An editorial (*Ibid.*, p. 1304) in commenting on the report on the commercially available quinine tannate, points out the need for physicians specifying the brand of quinine tannate desired or suggesting to the pharmacist that he secure for dispensing purposes a brand of quinine tannate that complies with the requirements outlined by the Council on Pharmacy and Chemistry.

SALVARSAN.—A book review calls attention to a volume on salvarsan published by Messrs. Meister, Lucius and Brüning Limited, 51 St. Mary Axe, London, E. C., for free distribution. This volume of 155 pages in addition to comments on the chemistry and the testing of salvarsan contains pharmacological notes, a discussion of the dosage and a number of clinical reports with a review of the literature up to the present time.—*Pharm. J. Lond.*, 1911, v. 87, p. 341.

BOOK REVIEWS.

ALLEN'S COMMERCIAL ORGANIC ANALYSIS. Volume v. Fourth edition. Entirely rewritten. Edited by W. A. Davis, London, and Samuel S. Sadtler, Philadelphia. Philadelphia: P. Blakiston's Sons & Co., 1012 Walnut Street, 1911. $5.00 net.

In the fifth volume of this work, we find a number of subjects treated which are of very great interest to pharmacists. The monograph on "Coloring Matters of Natural Origin" is the work of W. M. Gardner, Bradford, England. Here will be found very many facts relating to the properties, methods of assaying and the formative analytical examination of such important products as logwood, catechu, cutch, gambier, turmeric, gamboge, saffron, cudbear, alkanet, safflower, orchil, litmus, etc. There are two other equally interesting monographs on coloring substances, the one relating to the coal-tar dyes by Mr. W. P. Dreaper and Dr. E. Feilman, and the other to the "Dyestuffs of Groups 6 to 12" by Dr. J. T. Hewitt. These contain in very condensed form invaluable information which one interested in these subjects is likely to require almost daily. The chapter on the "Analysis of Coloring Materials," by Mr. Dreaper and Dr. Feilman, is particularly well done and will save the user of the book much time in looking up the original papers in the literature. Another chapter of great interest to pharmacists as well as food analysts is the one treating of "Coloring Matters in Food," by Mr. Albert F. Seeker. The monograph on "Tanneries" was written by Mr. W. P. Dreaper, and has been well done, although the subject is one of the most difficult for the analyst in practice. Finally there is a chapter on "Inks" by Mr. Percy H. Walker, of Washington. This is of the same high order of excellence as the other monographs.

It will well repay the pharmacist to have all of the volumes of

Allen's "Commercial Organic Analysis" in his laboratory. These words are not necessary to those who used these books for reference during their days at college or in the university. Books of this character should be on hand for immediate use when necessity arises. It is from the wise use of books that mortars and graduates become successful instruments in the solution of the perplexing problems that arise behind the prescription counter or in the laboratory.

AN INTRODUCTION TO VEGETABLE PHYSIOLOGY. By J. Reynolds Green, Fellow and Lecturer of Downing College, Cambridge. Third edition. Philadelphia: P. Blakiston's Sons & Co., 1012 Walnut Street. $3.00 net.

The first edition of Green's Physiology was published in June, 1900. The author's treatment of the subject was so happy and his style so clear, that in spite of the fact that there are several good books on plant physiology written by teachers in the United States, the work has been quite largely used here. Professor Green was at one time professor of botany to the Pharmaceutical Society of Great Britain, and is well known for his researches in plant physiology. In fact, many of his articles have been printed in the *Pharmaceutical Journal* of London and extensively reprinted in the drug journals of the United States.

Those of us who have used the volumes of the earlier editions are gratified to find that in the third edition we have in many particulars essentially a new book. The correlation of the internal structure of plants with their physiological needs is emphasized in the light of more recent morphological studies. Professor Green combats the idea expressed in certain quarters during the past few years, that many changes may go on in the protoplasm without involving any interchange of its substance. He holds this to be erroneous, for in all the reactions in which the protoplasm is concerned its own auto-decomposition and reconstruction are involved.

The book contains nearly 200 illustrations, mostly dealing with the inner structure of plants. The whole subject is one of such great interest and importance and the treatment is so admirable in Professor Green's book that students in pharmacy, as well as others, might well be encouraged to use it.

A MANUAL OF STRUCTURAL BOTANY. An Introductory Textbook for Students of Science and Pharmacy. By Henry H. Rusby, M.D., Professor of Materia Medica in the College of Pharmacy of the City of New York (Columbia University); Pharmacognosist of the United States Department of Agriculture; Member of the Committee for the Revision of the United States Pharmacopœia since 1890. Octavo, 248 pages, with 599 illustrations. Philadelphia and New York: Lea & Febiger, 1911. Cloth, $2.50 net.

From the prefatory note we understand that the present volume is the first of two companion volumes, the second of which will be devoted entirely to Commercial Pharmacognosy. For this reason the book has been designed as an introductory work to this subject, as well as to general botany. It has been planned to suit the needs of students of both general science and pharmacy. The elementary facts of plant-physiology have been considered in connection with the anatomy, but the subjects of vegetable histology and of microscopical methods and technique are omitted from this volume, its object being to teach the reader all that it is possible for him to do in the examination of drugs with the naked eye or with the pocket lens. With the exception of the last 25 pages, this volume of Dr. Rusby's work on "Structural Botany" reminds one very much of "The Structural Botany or Organography on the Basis of Morphology" of Prof. Asa Gray, published more than 30 years ago. The treatment of the subject is, however, quite different, Dr. Rusby considering the phytomer or phyton as the unit of structure. He regards the flower as a modified branch. Nearly one-half of the book is devoted to the study of the flower, including: Anthology, or its general nature; the laws of floral structure; the perigone; the androecium; the gynœcium; the torus and disc; dissection and analysis of flowers; and pollination and fertilization.

In the remaining chapters which deal with the structure of higher plants, we find a rather detailed and elaborate discussion of carpology or the functions and structure of the fruit, the seed, general structure of roots and stems, extension and appendages of the stem, the leaf and anthotaxy. There is a brief chapter on the cryptogams, and then follows a discussion upon botanical classification and analysis, botanical nomenclature and the collection and preservation of botanical specimens.

Dr. Rusby is well known for his studies in systematic botany, and as the author of a number of lengthy monographs on the Flora

of Bolivia. One might expect this book to embody the results of his critical study of plants in the field and herbarium during these many years.

POLIGLOTA VADE-MECUM DE. INTERNACIA-FARMACIO. By Celestin Rousseau. Paris: Librairie Hachette et Cie., 79, Boulevard Saint-Germain: 1911.

This book is quite novel, containing as it does, in readily accessible form, the comparative meaning of the terms used in defining and describing the substances included in the Pharmacopœias of nine different languages. It has been compiled with the hope that it will be useful to pharmacists of all countries and with the definite intention of facilitating the dispensing of medical prescriptions from abroad. It contains: 1. Comparative tables of formulæ of tinctures, extracts, pills, etc., in the different pharmacopœias. 2. The formulas of many preparations often prescribed in foreign countries. 3. A professional vocabulary in nine languages, which is arranged in such a manner that it can be used by any person who understands one of the following languages: English, German, French, Dutch, Italian, Spanish, Russian, Swedish or Esperanto. 4. General table of weights, measures, moneys, etc., of different countries. The work will no doubt be found very useful to pharmacists and physicians.

CHEMICAL ANALYSIS. By Prof. Frank X. Moerk. Published by the author. Philadelphia: 1911.

Professor Moerk, who is well-known to the members of the American Pharmaceutical Association for his papers dealing with the teaching of chemistry, the volumetric calculations of the U. S. P. (Proc. A. Ph. A., 1909), and classification of the quantitative statements of the U. S. P. (*Ibid.*, 1908), has recently published in two parts an outline of his laboratory courses in the Philadelphia College of Pharmacy. In Part I, "Course in Qualitative Analysis for Second-year Pharmacy Students" there is an excellent consideration of the groundwork required in the study of analytical chemistry. This study, as Professor Moerk states, "requires of the student the ability to write correctly the formulas of the substances used in the tests or experiments, which supplemented by the knowledge of a few general laws governing chemical changes, will enable the understanding of the reactions or changes taking place in the tests or experiments. This requisite fundamental knowledge consists in a

proper appreciation of the influence of the position of the elements in the electro-chemical series and the application of the valences of the atoms in the uniting of formulas of compound molecules, starting with the formula of binary molecules, and gradually leading up to the more complicated ternary molecules." These principles are clearly presented by Professor Moerk, and while we have numerous works dealing with the subject of qualitative analysis none is better adapted to needs of pharmacy students than the pamphlet in hand.

In the second part, entitled "Courses in Quantitative Analysis and Chemical Mathematics," attention is given to the methods for gravimetric determinations, volumetric determinations, gasometric determinations, organic analysis, alkaloidal assays, the determination of oils, fats and waxes, and the analysis of milk, vinegars and coloring matter. The portion dealing with "Chemical Mathematics" is a valuable part of the book.

A Pocket Medical Dictionary. By Dr. George M. Gould. Sixth edition, revised and enlarged. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut St. 1911. $1.00 net.

This is probably one of the best, if not the best, book of its class. It is of very convenient size, and the definitions are very succinct and clear cut. The author is the prince of medical dictionary makers, and it is doubtful if Dr. Gould's work in this respect has ever been surpassed. The professional man needs dictionaries and the less space they take and the more convenient they are, the more they will be used and the less will one have the necessity of regretting the misuse or misspelling of words.

Books for Pharmacists, Edited by Harry B. Mason, Editor of the *Bulletin of Pharmacy*, Detroit, Michigan: E. G. Swift.

Three very interesting books have recently come from the press of *The Bulletin of Pharmacy*. They concern the retail druggist and should prove very suggestive to him. One of these is on "Window Displays for Druggists," the second edition of which has been recently published. This comprises for the most part, engravings and descriptions of over a hundred attractive displays which have been used with success by druggists throughout the United States. It also contains some useful suggestions on the subject of window dressing in general. While of course it is not expected that phar-

macists will use the forms which are here illustrated, yet the suggestions will no doubt be helpful in stimulating each one's individuality.

A second book from the same press was published during 1910 and is entitled "350 Dollar Ideas for Druggists." This is a compilation of articles for which pharmacists were paid at the rate of $1.00 each. In this are given hints on dispensing, manufacturing, advertising, bookkeeping and business methods. Here again is a symposium on mechanical devices, business methods and other subjects which pharmacists have found helpful in the conduct of their business.

The latest book of this series is entitled "Board Questions Answered." In this are given complete sets of examination questions used by different boards of pharmacy. Answers to these questions have been compiled by Mr. John Helfman, Assistant Editor of *The Bulletin of Pharmacy,* for the benefit of graduates of pharmacy and unregistered men who desire to review their knowledge preparatory to taking the board examinations. The object of this book is, as stated by Mr. Mason in his introduction, "on the one hand, to refresh the memory of students who have already taken an adequate course of pharmacy, and on the other hand to give them an idea of the type and character of questions asked by the different boards of pharmacy. There is no doubt that even the recent graduate in pharmacy needs some such special preparation. The writer well recalls his experience in going before two boards of pharmacy within a year after he had completed his college course. He found it absolutely necessary in both cases to spend two or three weeks in freshening up, so to speak, as well as familiarizing himself with the sort of questions customarily asked by the two boards. Without this preparation the chances are that though he was just out from college, he would have failed in one or both examinations."

"So well is this condition of things realized that in one of the leading University Schools of Pharmacy—a school having high ideals of scholarship—a special course on pharmacy board questions and answers is included in the last year's curriculum."

MODERN DRUG STANDARDIZATION. H. K. Mulford Co., 1911.

The present pamphlet has been prepared with the view of furnishing special information on physiological methods and standards. It contains a great deal of valuable information for pharmacists and

physicians. The physiological standardization of the heart tonics and heart depressants are considered in a very lucid and direct manner. The same thing may also be said with regard to the physiological standardization of cannabis indica, ergot, suprarenal gland and the thyroid gland. The references to the important published papers will be found useful to the practitioner or pharmacist who desires to look up the subject further.

THE POCKET MEDICAL DICTIONARY. Edited by W. A. Newman Dorland. Seventh edition, revised and enlarged. Philadelphia and London: W. B. Saunders & Co.

Dorland's pocket dictionary is of very convenient size for general use. The selection of words is fairly complete and the definitions are adequate for general use.

PHARMACEUTICAL MEETING.

The second Pharmaceutical Meeting of the course was held on the afternoon of November the 13th in the Museum of the College, President Howard B. French presiding. The first paper read was one by M. D. Allen, P.D., on "The Preparation of Solution of Citrate of Magnesia." He spoke of the various efforts that he had made to produce a satisfactory and permanent solution, one of which was by thoroughly cleansing the bottles with a solution of sodium carbonate. While some of these improved the solution, the fungus growth would ultimately come if the solution was kept on hand long enough. He now sterilizes the solution by placing the bottles containing the finished product in a common wash boiler, just covering them with water and then boiling for thirty minutes. His solution was a little weaker than the official in citric acid; he flavored it with oils of lemon, orange and tincture of ginger. Mr. W. E. Lee said that he had used sterilization for four years; he washed his bottles by the aid of sulphuric acid. Mr. W. L. Cliffe said that he believed in sterilization; he also said that if Mr. Allen did not follow the U. S. P. formula he should change his label and call it Allen's Solution of Citrate of Magnesia; such a label would comply with the law. Professor Kraemer spoke of the advantage of using a mixture of sulphuric acid, 1 pound, to four ounces of potassium dichromate in cleaning the bottles. Professor Lowe said he was interested in the discussion, especially on account of the author of the

paper having started his pharmaceutical career in his employ. He had practiced the sterilization of magnesium citrate solution for several years with most satisfactory results. In speaking of boilers, he said that it was better to use one composed entirely of tin, or of copper; a tin boiler with a copper bottom would not last so long, on account of galvanic action. President French gave some timely caution about following the law exactly, and the danger of taking advice to the contrary. He cited the case of a gentleman who had obtained the highest legal advice, even that of the Attorney-General of the United States, with reference to a business procedure which seemed somewhat at variance with the strict letter of the law. The advice was favorable to the enterprise and he acted accordingly, but later had the mortification of having a warrant issued by the government for his arrest for violation of the law. He also referred to the danger of copper poisoning in the use of copper vessels by the formation of verdigris.

C. Mahlon Kline then read a paper which contained some interesting comments on the Thirty-seventh Annual Meeting of the National Wholesale Druggists' Association. Professor C. B. Lowe spoke of the rapid deterioration of stillingia on keeping, also of buchu and the triangular gold signs put out by Helmbold in the 70's, on which was represented the gathering of the leaves by Hottentots from plants which looked like rushes; he also spoke of the high price of ginseng as being no criterion of its value, and of the care taken in India in the cultivation of cannabis indica. Professor Kraemer spoke about the increased cost of valuable indigenous drugs and that this price would ultimately have to be paid by the people. He also said that investigations were needed of nearly all plant drugs. Mr. J. W. England spoke approvingly of the work of the Bureau of Plant Industry at Washington; he also referred to the improvement of certain drugs by cultivation, notably, cinchona bark, and he thought that the standards might be improved by methods of cultivation. Mr. William E. Lee then read an interesting paper on "The Work of the Thirteenth Annual Convention of the N. A. R. D." After which several of those present referred in complimentary manner to the work of the association, and that of its efficient secretary, Thos. H. Potts. Professor Kraemer said that he wondered why the word "commercial" was so often used in referring to the work of the N. A. R. D., when as a matter of fact it is in many instances of the highest professional character as

seen in the U. S. P. and N. F. propaganda. A paper was read by Mr. J. W. England on "The Detection of Gum Ammoniacum and Gum Galbanum in Asafetida," prepared by Messrs. H. M. Seckler and M. Becker from the research department of Smith, Kline and French Company. The greatly increased cost of asafetida under the rulings of the "Pure Food and Drugs Law" had led to some adulteration by the above mentioned drugs. Various tests were given, one of the best being the production of volatile oils by steam distillation which would show a ten per cent. adulteration. Attention was called to the unique program issued by the German Apothecaries Society of New York, at the recent celebration of their sixtieth anniversary, also to some fine mounted specimens of flax presented by President French, one of the specimens being of American origin, one of Canadian, one of Argentine. The same card contained a specimen of the soy-bean plant, in fruit. After a vote of thanks to the authors of the papers read, and the referring of them to the publication committee, the meeting adjourned.

C. B. Lowe.

NOTES AND NEWS.

President French Portrait Fund.—Mr. Richard M. Shoemaker, treasurer of the Philadelphia College of Pharmacy, has sent in the following names of additional contributors to the President French Portrait Fund (see this Journal, pp. 237, 249 and 258):

Felicano Paterno, Santa Cruz, Manila.
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J. C. Ladakis, Beirut, Syria, Turkey.
Guadalupe Morales, Granda, Nicaragua.
J. H. McCracken, Dinuba, California.
E. V. Howell, Chapel Hill, N. C.

Turin Exhibition Awards.—Messrs. Burroughs, Wellcome & Co. have secured no less than thirteen awards—eight grand prizes, two diplomas of honor, and three gold medals—for their exhibits at the Turin International Exhibition. This probably constitutes a world's record in awards received by a single firm at an exhibition open to all nations.

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TO VOLUME 83 OF THE AMERICAN JOURNAL OF PHARMACY.[1]

AUTHORS.

[1] Compiled by Florence Yaple.

SUBJECTS.

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Monday, November 6th, 1911, at 3.30 P. M.

"BACTERIOLOGY IN ITS RELATION TO PUBLIC HEALTH." By Randle C Rosenberger, M. D., Professor of Bacteriology and Hygiene, Jefferson Medical College.

Monday, November 20th, 1911, at 3.30 P. M.

"MEDICINAL PLANTS GROWING IN THE VICINITY OF PHILADELPHIA." (Illustrated) By Stewardson Brown, Curator of Botany, Academy of Natural Sciences, Philadelphia.

Monday, December 4th, 1911, at 3.30 P. M.

"RECENT PROGRESS IN ELECTROCHEMICAL ANALYSIS." By Edgar F. Smith, Ph. D., LL.D., Provost and Professor of Chemistry, University of Pennsylvania.

Monday, December 18th, 1911, at 3.30 P. M.

"THE DRUG MARKETS OF THE WORLD." By Albert Plaut, Wholesale Druggist, New York.

Friday, January 5th, 1912, at 3 P. M.

"DYEWOODS AND DYEWOOD EXTRACTS." By T. Chalkley Palmer, Chemist of the American Dyewood Company, Chester, Pa.

Friday, January 19th, 1912, at 3 P. M.

"THE ESTABLISHING OF LEGAL STANDARDS FOR FOODS AND DRUGS." By Wm. Frear, Ph. D., Professor of Chem sty at Pennsylvania State College and Chairman of Committee on Standards, A.O.A.C.

lege of Pharmacy

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ance is not restricted to the student body and members of the College, but an invitation is extended to the public, especially to pharmacists, who may be interested to come and share in the profit and enjoyment of the course or any of the individual lectures.

It will be noted that the lectures are not all scheduled at the same hour, some being at 3 P. M. and others at 3.30 P. M., this arrangement being made to conform to the College roster.

Friday, February 9th, 1912, at 3 P. M.

"PRESENT PROBLEMS IN STATE AND NATIONAL PHARMACEUTICAL LEGISLATION." By John C. Wallace, Ph. M., New Castle, Pa., Chairman of Section on Education and Legislation A. Ph. A.

Friday, February 23rd, 1912, at 3 P. M.

"HOMEOPATHIC PHARMACY." By Dr. Thomas H. Carmichael, Professor of Pharmacodynamics at Hahnemann Medical College, Philadelphia.

Friday, March 8th, 1912, at 3 P. M.

"SERUMS, VACCINES, BACTERINS AND OTHER BIOLOGIC PRODUCTS." By Charles E. Vanderkleed, B. S., Chief Chemist of H K. Mulford Co., Philadelphia.

Friday, March 22nd, 1912, at 3.30 P. M.

"THE CHEMISTRY AND TECHNOLOGY OF BAKELITE." By Dr. L. H. Baekeland, Ph. D., Research Chemist, New York City.

Friday, April 5th, 1912, at 3.30 P. M.

"WINDOW DRESSING FOR PHARMACISTS" By Mr. H. Harfman, Window Decorator for George B. Evans & Co., Philadelphia.